OGIP Calibration Memo CAL/GEN/94-004

How to Install a Calibration Database

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SUMMARY

This document describes the steps required to install and build a local Calibration Database (CALDB) system: construction of the filesystem, transfer of the desired calibration files from the HEASARC calibration database and installation of the calibration files into the 'Calibration Index Files' (CIFs). Once set-up, the continued maintenance/management of a local CALDB is covered in OGIP Calibration Memo CAL/GEN/92-015.

Contents

1 Introduction

This document is intended to provide instructions for 'local CALDB managers' wishing to set up a local copy of the HEASARC's calibration database (CALDB) system.h

The HEASARC CALDB system is modular on a instrument-by-instrument basis in the sense that it allows remote users/sites the flexibility to pick and choose which mission/instrument combinations their local CALDB includes. It also allows a lot of flexibility concerning where files are stored (*i.e.,* disk partitions, directory structures, *etc.*). Furthermore, it is possible to **customize** the local set-up with (*i*) non-HEASARC-supported missions and/or (*ii*) HEASARC-supported missions but with personal/locally-produced calibration datasets added.

All questions, comments and suggestions should be directed to:
caldbhelp@athena.gsfc.nasa.gov

First, please make sure that the FTOOLS software is available at your site. The FTOOLS package contains management & access software for your local CALDB, and your CALDB will be of little use without it. A check as to whether FTOOLS

are available is given in **Section 5.4**, and details on how to get FTOOLS in **Section 5.5**.

If you wish to install your CALDB in the simplest and easiest way please use the Perl script **install_caldb.perl** (BETA-version currently available from the HEASARC). Please see **APPENDIX I** for information on the required version of Perl and the Perl modules necessary for this script to run.

1.1 Overview of Installation

- Decide on the top-level directory to your CALDB (*i.e., /abc/def/caldbtop*). For information on the amount of disk space required see **Table I Section 2**.
- Run the script **install_caldb.perl** for an automated installation (see **Section 3.1**). However if you do not have Perl, you must perform a manual installation (see **Section 3.2**).
- Source your CALDB initialisation file (see also **Section 3.1**).

2 Selecting a directory location

Whatever directory location you choose for your local CALDB, you should make sure that there is enough room for your current needs and a little room to grow. As the HEASARC calibration database updates its calibration files for your mission/instrument(s), these files will be made available to you and may cause the disk-space requirements of your local CALDB to increase. In addition, the directory on

which you locate your local CALDB should be available to everyone who will want to access its files. Due to the potentially large size and nature of the HEASARC Calibration Database, we recommend that (if possible) only one local caldb be installed and maintained at any site.

At the HEASARC there are a number of scripts running which automatically produce for certain mission/instruments:

- ASCII listings of the files deemed 'good quality' by the CALDB/GOF, along with diskspace requirements.
- Compressed tar files (*.tar.Z) of all the good quality calibration files and the appropriate caldb.indx file for each mission/instrument

Such information is held on :
goodfiles_*miss_inst*_**size.new** and
goodfiles_*miss_inst*.**tar.Z**

available from the HEASARC via either http://heasarc.gsfc.nasa.gov/docs/heasarc/caldb/caldb_goodsize.html
or
ftp://legacy.gsfc.nasa.gov/caldb/data/ in the *mission*/*inst*subdirectories, for example ftp://legacy.gsfc.nasa.gov/caldb

The mission/instruments currently available at the HEASARC are:

TABLE I

Mission	Instrument	Approx diskspace requirement (Mbytes)
ASCA	GIS	98
	SIS	85
	XRT	4
ROSAT	HRI	1
	PSPC	11
	XRT	0.2
XTE	PCA	14

However for the most up-to-date diskspace requirements please examine: goodfiles_*miss_inst*_**size.new**

It is anticipated that such information will also be available for several other mission/instruments (*i.e.,* EXOSAT, BBXRT, *etc.*) sometime in the near future.

3 Installation

The easiest installation possible is to exactly duplicate the HEASARC calibration database for those mission/instuments in which you are interested. If you follow the EZ_CALDB route, then this is what will happen. The most difficult installation is obviously to create a **customized** directory structure (see **Section 3.3**).

3.1 EZ_CALDB : automated installation using Perl script

N.B. If you don't have Perl on your machine, please see **Appendix I**.

1. Run the script **install_caldb.perl**
   i.e., **install_caldb.perl** (dspace_check)
   – The parameter "dspace_check" is optional (can simply type "d"); if included the user will be engaged in INTERACTIVE checking of available diskspace prior to the uncompression and untarring of each data file. If omitted the script will just go ahead and attempt to uncompress and untar the files NON-INTERACTIVELY.

   The script will prompt you for the following information :

- The name of the top-level directory to your CALDB *i.e. /abc/def/caldbtop*
  The **default** top-level directory being */current_directory/caldbtop*
- Confirmation that the full path given to your CALDB *i.e. /abc/def/caldbtop* is the one you actually want.
  – If **YES** the program will continue
  – If **NO** the program will terminate
- The mission and instruments in which you are interested.
  – (When the **.tar.Z* files are being downloaded via ftp, you may want to check that something is actually happening! Please open up another command window and intermittently type the appropriate command to indicate the gradual depletion of available diskspace on */abc/def/caldbtop*)

Self-explanatory messages are issued to the screen to indicate the success/failure of each stage of the installation.

2. When **install_caldb.perl** has finished, to complete the installation you **MUST** source the appropriate CALDB initialisation file:

   If you have a unix-style system which runs FTOOLS *outside IRAF* type:
   source */abc/def/caldbtop*/**software/tools/caldbinit.unix** for the C-shell
   source */abc/def/caldbtop*/**software/tools/caldbinit.sh** for the Bourne-shell

   If you have a unix-style system which runs FTOOLS *from within IRAF* simply type:
   source */abc/def/caldbtop*/**software/tools/caldbinit_iraf.unix**

   THEN PLEASE INFORM YOUR USERS TO APPEND THIS SOURCE COMMAND TO THEIR .LOGIN FILES. The CALDB will then be available to them every login session.

3. **What do I do to verify that the installation was successful?**

   Use the task `caldbinfo` which is distributed within the FTOOLS software package, with the `infomode` parameter set to `infomode=INST`, to check that the local CALDB is set up for the mission/instrument(s) you think it ought to be. At the operating system prompt, type:
   `caldbinfo infomode=INST chatter=30`

   - if NO the task `caldbinfo` did not run
     – then FTOOLS are probably not available to you. Go to **Section 5.4**.
   - if YES the task `caldbinfo` did run
     – then you will be prompted for the mission & instrument in which you're insterested. For example choosing the mission `ASCA` and instrument `SIS0` will result in output including a line to the effect of:
       * either
         `ERROR...CALDB NOT correctly configured for the SIS0 instrument ...`

If this is the case, then either an alias is used by the CALDB for that mission and/or instrument, or unfortunately something failed in your installation. Try a few common acronyms, double check the steps you followed in this document, and if you still can't figure it out, contact the CALDB Hotseat at
`caldbhelp@athena.gsfc.nasa.gov`

* or
`...... CALDB is configured for the SIS0 instrument onboard ASCA`
`......... Cal Index File:` *caldbtop/path1/file*
`......... Data directory:` *caldbtop/path2*
If this is the case, then **congratulations !**, you really are ready to use it.

3.2 EZ_CALDB : manual installation

1. Establish the top-level directory to your CALDB *i.e. /abc/def/caldbtop*
2. **Set the current working directory** to */abc/def/caldbtop*
3. Obtain the compressed tar files **goodfiles**_*miss_inst*.**tar.Z** and the associated c-shell scripts for the mission and instruments in which you are interested :
i.e. **goodfiles_asca_gis.tar.Z** and **asca_gis_caldb.csh**

   available from http://heasarc.gsfc.nasa.gov/docs/heasarc/caldb/caldb_install.html
   or
   anonymous ftp from `heasarc.gsfc.nasa.gov` in the directory **/caldb/data/***miss*/*inst*
   i.e. **/caldb/data/asca/gis**
   and the directory **/caldb/local/scripts/untar** respectively

   Also you MUST download the files **caldb_setup_files.tar.Z** and **caldb_env_setup.csh** from the above **URL**. However if using anonymous ftp you may access the files in the directories **/caldb/software/tools** and **/caldb/local/scripts/untar** respectively. **caldb_setup_files.tar.Z** contains files which are ESSENTIAL for the CALDB environment set-up.

   – (When the **.tar.Z* files are being downloaded via ftp, you may want to check that something is actually happening! Please open up another command window and intermittently type the appropriate command to indicate the gradual depletion of available diskspace on */abc/def/caldbtop*)

   ***** Then for** *each* **compressed tar file *** :**

4. Run the associated c-shell script. This untars and deletes the tar file AND (if not **caldb_setup_files.tar.Z**) puts the caldb.indx in the correct place.

When you have performed the above on **all** the *.tar.Z files, you will find there are 4 files present in the directory */abc/def/caldbtop*/**software/tools**. These files are ESSENTIAL for your CALDB installation since they used to set-up the CALDB environment. Simply

1. cd */abc/def/caldbtop*/**software/tools**.
2. Edit the **caldbinit.unix** and **caldbinit.sh** files or the **caldbinit_iraf.unix** file (depending on whether you have a unix-style system which runs FTOOLS *outside IRAF* or *from within IRAF*) such that the line(s) which defines the environment variable CALDB points to the top-level directory of your local CALDB.
   i.e. replace **/FTP/caldb** with */abc/def/caldbtop*
3. Source the appropriate CALDB initialisation file:

   If you have a unix-style system which runs FTOOLS *outside IRAF* type:
   source */abc/def/caldbtop*/**software/tools/caldbinit.unix** for the C-shell
   source */abc/def/caldbtop*/**software/tools/caldbinit.sh** for the Bourne-shell

   If you have a unix-style system which runs FTOOLS *from within IRAF* simply type:
   source */abc/def/caldbtop*/**software/tools/caldbinit_iraf.unix**

   THEN PLEASE INFORM YOUR USERS TO APPEND THIS SOURCE COMMAND TO THEIR .LOGIN FILES. The CALDB will then be available to them every login session.

Finally, you will notice that a file **goodfiles**_*miss_inst*_**special.ASCII** is present on each mission/instrument data directory:
i.e. **goodfiles_asca_gis_special.ASCII** on */abc/def/caldbtop*/**data/asca/gis**.
These files are not necessary for your present purposes and may be deleted. In addition, a file **input.ASCII** will be present on */abc/def/caldbtop*/**data** and this may also be deleted.

What do I do to verify that the installation was successful?

Please see **Section 4**.

3.3 Creating a customised directory structure

Customising the local CALDB set-up means *either* or *both* of the following :

- The CALDB will contain a mission and/or instrument NOT supported by the HEASARC.
  i.e. mission=*STREK*, instrument=*LASERGUN*
  or mission=**XTE**, instrument=*GSPC*
- The CALDB will contain personal or locally produced datasets to be added to both mission/instruments which the HEASARC supports.
  i.e. mission=**XTE**, instrument=**PCA**, calfile=*local_dataset.fits*

Obviously the above neccesitate that the associated calibration files are in OGIP-approved FITS format and conform to the OGIP-approved naming conventions. The files should also contain the mandatory

keywords in their extension headers such that the files can be indexed and thus made accessible to the s/w. Documentation on the latter is available from http://heasarc.gsfc.nasa.gov/docs/heasarc/caldb/docs/memos/cal

3.3.1 Customising a non-HEASARC mission and/or instrument

Assuming you already have a CALDB set-up and operable :

1. Edit your */caldb_topdirectory/***software/tools/caldb.config file :**

   If you are including a NON-HEASARC mission then append the line:
   – *# STREK*

   If there is just ONE instument called *LASERGUN* then append the line:
   – *STREK LASERGUN* CALDB data*/strek/lasergun* caldb.indx CALDB data*/strek/lasergun*

   If an instrument is duplicated *i.e.* there are 2 *LASERGUN* aliases (*LASERGUN1* and *LASERGUN2*) then append the lines:
   – *STREK LASERGUN1* CALDB data*/strek/lasergun* caldb.indx CALDB data*/strek/lasergun*
   – *STREK LASERGUN2* CALDB data*/strek/lasergun* caldb.indx CALDB data*/strek/lasergun*

   Repeat the above for other instruments (if any).

   Obviously if the mission is already HEASARC supported then *STREK* and *strek* will be replaced by the HEASARC mission name.

2. Create the directory structure
   /caldb_topdirectory/data/*strek/lasergun*/cpf/..../.../ and
   /caldb_topdirectory/data/*strek/lasergun*/bcf/..../.../
   followed by the appropriate sub-directories depending on the dataset contents *i.e. collresp* or *matrices etc.*

   Obviously if the mission is already HEASARC supported then *strek* will be replaced by the HEASARC mission name.

3. Populate your sub-directories with your calibration files.

4. If the NON-HEASARC MISSION CONTAINS INSTRUMENT ALIASES, you must change your */caldb_topdirectory/***software/tools/alias_config.fits** file.

   Infact another binary table extension needs to be added for the *STREK* satellite, indicating values for the ALIAS, ALIAS_NO and VALUES fields.
   i.e. ALIAS=*LASERGUN*, ALIAS_NO=2, VALUES=*LASERGUN1, LASERGUN2*

   –To change your *caldb_topdirectory*/**software/tools/alias_config.fits** file you will need to use the FTOOLS :

(a) **fcreate** (to create a .FITS file containing the *STREK* instrument alias information)
(b) **fappend** (to append the .FITS file created in *(a)* to the **alias_config.fits** file).

If the MISSION IS ALREADY HEASARC supported, but the NON-HEASARC INSTRUMENT CONTAINS INSTRUMENT ALIASES, you will still need to change your /*caldb_topdirectory*/**software/tools/alias_config.fits** file.

In this case the binary table extension for that mission has to be modified. You will therefore need to use the FTOOLS :
(a) **fcreate** (to create a .FITS file containing the instrument alias information for ALL instruments of that mission)
(b) **fextract** (to extract the FITS extension for the other mission(s) present in **alias_config.fits**
(c) **fappend** (to append the file created in *(a)* to the file created in *(b)*) ....then name the resultant file /*caldb_topdirectory*/**software/tools/alias_config.fits**

5. Create a caldb.indx file in */caldb_topdirectory*/data/*strek/lasergun* using the FTOOL **crcif**
   – **crcif** merely creates an empty caldb.indx file.

   Obviously if the mission is already HEASARC supported then *strek* will be replaced by the HEASARC mission name.

6. Index your cal files in the caldb.indx by running the FTOOL **udcif**. Run **udcif** from the subdirectory which contains the cal file since the tool looks at the cwd to determine the path to the file and then writes the path to the CAL_DIR column in the caldb.indx and the filename to the CAL_FILE column.
   – input calibration filename
   – input name (& location) of the index file
   – input quality value of dataset being entered (0 ..for 'good' quality hopefully!)

7. Perform an **fdump** on the caldb.indx to check the files have been indexed correctly

What do I do to verify that the installation was successful?

Run the task **caldbinfo** as indicated in **Section 4** where mission is *STREK* and instrument is *LASERGUN* (or *LASERGUN1/LASERGUN2*). The o/p will then obviously indicate wether your CALDB has been correctly set-up for *STREK* and *LASERGUN*.

Obviously if the mission is already HEASARC supported then *STREK* will be replaced by the HEASARC mission name.

If you do not already have a CALDB :
You can either :

- Follow **EZ_CALDB** **using perl script** to set-up your CALDB (see **Section 3.1**).
  Then proceed with instructions 1-7 given previously in this section (**3.3.1**).

or

- Follow **EZ_CALDB** **manual installation** to set-up your CALDB (see **Section 3.2**). Then proceed with instructions 1-7 given previously in this section (**3.3.1**).

3.3.2 Customising a HEASARC mission/instrument with personal or locally produced datasets

Such customisation is recommended **only** to users who have a detailed knowledge of the calibration datasets, and wish to investigate the effect on their scientific results of using personal calibration (or developemental calibration datsets not yet released to the community).

Assuming you already have a CALDB set-up and operable :

1. Populate the appropriate sub-directories with your local/personal calibration files.
   *i.e. /caldb_topdirectory/***data/xte/pca/cpf/responses/95apr03/***local.rmf*
2. Run the FTOOL **cifcadd** (to add an extra column, CAL_ORIG, to the caldb.indx file *i.e. /caldb_topdirectory/***data/xte/pca/caldb.indx**, whilst retaining all the caldb.indx information therein. All cal datasets will be flagged by default as 'HEASARC' in the CAL_ORIG column).
3. Index your local cal files in the caldb.indx by running the FTOOL **udcif**. Run **udcif** from the sub-directory which contains the cal file since the tool looks at the cwd to determine the path to the file and then writes the path to the CAL_DIR column in the caldb.indx and the filename to the CAL_FILE column.
   – input calibration filename
   – input name (& location) of the index file
   – input quality value of dataset being entered (0 ..for 'good' quality hopefully!)
4. Run the FTOOL **caldbflag** (to flag all the **locally produced calibration files** as 'LOCAL' in the CAL_ORIG column of the caldb.indx file).
5. Perform an **fdump** on the caldb.indx to check the local files have been indexed correctly

If you do not already have a CALDB :
You can either :

- Follow **EZ_CALDB** **using perl script** to set-up your CALDB (see **Section 3.1**). Then proceed with instructions 1-5 given previously in this section (**3.3.2**).

or

- Follow **EZ_CALDB manual installation** to set-up your CALDB (see **Section 3.2**). Then proceed with instructions 1-5 given previously in this section (**3.3.2**).

4 Checking your installation

That's all ! – hopefully you're now the proud owner of a functioning local CALDB.

Use the task `caldbinfo` which is distributed within the FTOOLS software package, with the `infomode` parameter set to `infomode=INST`, to check that the local CALDB is set up for the mission/instrument(s) you think it ought to be. At the operating system prompt, type:
`caldbinfo infomode=INST chatter=30`

- if NO the task `caldbinfo` did not run
  - then FTOOLS are probably not available to you. Go to **Section 5.4**.
- if YES the task `caldbinfo` did run
  - then you will be prompted for the mission & instrument in which you're insterested. For example choosing the mission `ASCA` and instrument `SIS0` will result in output including a line to the effect of:
    - either
      `ERROR...CALDB NOT correctly configured for the SIS0 instrument` ...
      If this is the case, then either an alias is used by the CALDB for that mission and/or instrument, or unfortunately something failed in your installation. Try a few common acronyms, double check the steps you followed in this document, and if you still can't figure it out, contact the CALDB Hotseat at
      `caldbhelp@athena.gsfc.nasa.gov`
    - or
      `...... CALDB is configured for the SIS0 instrument onboard ASCA`
      `......... Cal Index File:` *caldbtop/path1/file*
      `......... Data directory:` *caldbtop/path2*
      If this is the case, then **congratulations !**, you really are ready to use it.

5 Common problems and faqs

5.1 What happens if install_caldb.perl informs that .. some requested *.tar.Z files...

have NOT been successfully un-tarred ... please see caldb_err.log."

This message will be undoubtedly due to disk space problems. Simply
(*i*) Consult your systems manager regarding the aquisition of more diskspace.
(*ii*) Examine caldb_err.log to determine which mission/instrument(s) failed.
i.e. **goodfiles_rosat_pspc.tar.Z**
(*iii*) Run **install_caldb.perl** again, requesting the tar.Z file for the appropriate mission and instrument *i.e.,* **rosat pspc**.

5.2 What does the install_caldb.perl script actually do?

(*i*) Creates the full path to your CALDB *i.e. dirtop = /abc/def/caldbtop.* N.B. The sub-directory *caldbtop* is created if it doesn't already exist.
(*ii*) Changes the current working directory to *dirtop*
(*iii*) Obtains compressed tar files for the selected mission and instruments via anonymous ftp from `heasarc.gsfc.nasa.gov`. The file **caldb_setup_files.tar.Z** (containing files which are essential for the CALDB environment set-up) is also downloaded.
(*iv*) Uncompresses and untars the files.
(*v*) Creates the appropriate directory structures.
(*vi*) Populates the directory tree with files.
(*vii*) Edits both the **caldbinit.unix** and **caldbinit.sh** files or the **caldbinit_iraf.unix** file (located on *dirtop*/**software/tools**) such that the line which defines the environment variable CALDB points to the top-level directory of your local CALDB.

5.3 I just don't understand

No problem, we'll help you. Don't be shy, just contact us via one of the routes given in **Section 6**.

Please do, since if we don't hear about your problems, we're unlikely to be able to fix them. Most likely they are trivial and the result of the documentation being insufficient or ambiguous.

5.4 Do I have FTOOLS?

All the CALDB access software is distributed through the FTOOLS software package. Again, the reader should verify that indeed FTOOLS are available at their institution and determine its location. The easiest way to check for FTOOLS is to type the following at the operating system prompt:
`fhelp ftools`

- if NO the command is not recognized

  - then FTOOLS are not available to you. We suggest you ask around locally as to whether anybody knows whether FTOOLS are available anywhere on your system (also check with your system adminstrator).
    * if NO FTOOLS are not available locally
      · then go to **Section 5.5**.
    * if YES you found a local copy of FTOOLS
      · then do whatever is necessary to make them available to your account.

- if YES a list & one-line description of all the tools is written to `STDOUT`,
  - then FTOOLS are available to you.

5.5 How do I get FTOOLS?

The FTOOLS software package is available from http://heasarc.gsfc.nasa.gov/docs/software/ftools/ftools_release.html

5.6 Why doesn't the FTOOLS installation set up a local CALDB ?

The FTOOLS installation does **NOT** automatically include the setting up of a local CALDB. The reasons for this are:

- Primarily Disk-space !
  The total data holding of the CALDB at NASA/GSFC is $\sim$ 1.4 Gbyte at the time of writing. **Don't panic** – this includes files flagged as both "Good" and "bad" for all the mission/instruments for which the HEASARC has data. It is extremely likely that any given site will only require a small fraction of these. We believe users are best equiped to manage their own disk-space, and anticipate most sites will want to be selective as to what calibration datasets they copy for selected mission/instruments.
- As should clear from this document, the CALDB system allows remote users/sites some flexibility to customize their set-up, allowing then to add personal/locally-produced calibration datasets for both mission/instruments which the HEASARC supports and other mission/instruments.

The inclusion of all possible options within the FTOOLS installation would require far too much interactive i/p during the installation for most users to stomach.

6 And finally....How to Un-install a CALDB

This involves the complete removal of your entire CALDB directory tree and files therein. The environment variable CALDB must then be unset, and the command to source your CALDB initialisation

file within your (and your users) .login file must be deleted. Such action is necessary if, for instance, you want to place your CALDB somewhere else (*i.e.* on a different disk partition), or you decide that you do not infact require a CALDB for your present analysis purposes.

- cd to the top-level directory to your CALDB *i.e. /abc/def/caldbtop.*
- cd to one directory below *caldbtop i.e. /abc/def.*
- Remove *caldbtop* using the command **rm -r** *caldbtop.* This will prompt you for the removal of the entire directory tree beneath *caldbtop* and the associated files AND *caldbtop* itself.
- Unset the CALDB environment variable *i.e.* **unsetenv CALDB**.
- Delete the line in your .login file which sources your CALDB initialisation file. *i.e.* '**source** */abc/def/caldbtop*/**software/tools/caldbinit.unix**'.

  PLEASE INFORM YOUR USERS TO ALSO DELETE THIS LINE FROM THEIR .LOGIN FILES.

7 IF ALL ELSE FAILS ...

Send e-mail to:
caldbhelp@athena.gsfc.nasa.gov

8 APPENDIX I

Since the CALDB installation script **install_caldb.perl** uses file transfer protocol to download files from the HEASARC, your system manager will need to install the packages **libnet-1.05_01.tar.gz** and **Data-Dumper-2.07.tar.gz** from the Comprehensive Perl Archive Network (CPAN).
See **http://www.perl.com/CPAN**.
These packages require that **Perl 5.002 or better** be installed on your machine (**Perl 5.002** or better) however, do not contain either of the above packages as part of their default distribution).

Your system manager should then replace the 1st line of the perl script

#!/usr1/local/bin/perl5

with the location of perl on your system. For example if perl is located in /usr/local/bin/perl then the 1st line should of the perl script should read

#!/usr/local/bin/perl